

Modeling and Designing Indices of Talent Identification in the Field of Basketball Based on Physical-Motor, Psychological, Anthropometric, and Physiological Parameters

Keshavarz Loghman¹, Farahani Aboalfazl¹, Zarei Bidsorkhi Ali²

¹Professor of Department of Sport Management, Payame Noor University, Tehran, Iran, ²Instructor of Department of Sport Management, Payame Noor University, (Ph.D Student of Sport Management, Payame Noor University), Iran

ORCID:

Keshavarz Loghman: <https://orcid.org/0000-0003-4469-4596>

Abstract

Aims: The purpose of this study was to modeling and designing indices of talent identification (TID) in the field of basketball based on physical-motor, psychological, anthropometric, and physiological parameters. **Materials and Methods:** The research method was qualitative (grounded theory) that was done on the field by interpretive analysis of deep interviews, including 21 experts in; TID (among professional clubs), basketball coaches (among premier league), and university professors (among professors of Tehran University, Shahid Beheshti University, and Kharazmi University). The validity of the interviews was confirmed by verifying the views of experts in the final results, and the reliability of the interviews was also confirmed through process audits and intrasubject agreement of two coders (84%). The analysis of interviews was done through interpretive analysis technique using open coding, axial coding, and selective coding. **Results:** As a result of the analysis of the interviews, 10 categories, 30 subcategories, and 101 key concepts were extracted. After axial and selective coding of the categories, a paradigm model was presented for TID in basketball. **Conclusions:** Finally, further explanations and suggestions are provided for each of the categories.

Keywords: Anthropometric, basketball, physiological parameters, psychological, qualitative research theory, talent identification

INTRODUCTION

In recent years, TID programs have grown in popularity and are seen as critical avenues to maximize athletes' potential to achieve success.^[1,2] This has also been reflected by a surge in research conducted on understanding issues of TID and the development of sport expertise over the past two decades.^[3] This is especially true as pressure for nations to excel in sport at the international level is greater than ever.^[1] Talent identification (TID) is a topic with special importance in the world of sports. Determining the distinctive characteristics of elite athletes compared to the ordinary ones makes it difficult to address the issue of TID.^[4] There was a clear overrepresentation of studies that^[1] examined physical profiles of athletes (60%);^[2] focused on male samples (65%);^[3] examined athletes between the ages of 10 and 20 years (60%)

and^[4] were published between the years 2010 and 2015 (65%). On closer examination, there was a high degree of variability in the factors that were found to discriminate between skilled and less-skilled individuals. TID programs are an integral part of the selection process for elite-level athletes. While many sport organizations utilize TID programs, there does not seem to be a clear set of variables that consistently predict future success.^[5] This is why most countries in the world are trying to develop the infrastructures of identifying talented and elite athletes at an early age. They focus on the specific capabilities of talented people to enhance their progress in certain sports.^[6]

Address for correspondence: Dr. Keshavarz Loghman, Department of Sport Management, Payame Noor University, Tehran, Iran. E-mail: keshavarzlo@yahoo.com

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Sport talent is determined in a complicated method under the influence of environmental and genetic conditions. The process of discovering how individuals reach a certain outcome has been defined as modeling. In this regard, there are various patterns or models proposed for the athletic TID that can help to its better understanding and identification and also be used depending on the circumstances. Furthermore, one of the key points in TID is the systemic attitude. In this process, different organizations and individuals play a role that through their coherent and coordinated activities, contribute to its progress. These systematic and targeted systems are usually associated with fewer errors, and they use valid models as well.^[7] TID and development models are diverse in terms of their contents. The models in the field of TID have paid more attention to the process of identifying superior talents within a limited scope and in terms of selecting talented individuals among others. Among these types of models, one can refer to the TID models presented by Gimbel,^[8] Harre,^[9] Matsudo,^[10] Peltola,^[11] Abbott and Collins,^[12] Côté *et al.*,^[13] Vaeyens *et al.*,^[14] Burgess and Naughton,^[15] and Houlihan and Chapman.^[16] In fact, these types of models have an operational and limited approach, and conventionally, they are focused on selecting the individuals on the basis of certain criteria and parameters and predicting their future performance. TID parameters and their role in predicting the performance of individuals in the future are so important that much of the research on TID has focused on identifying TID parameters in different sport fields. In most of these studies, physiological,^[17-23] psychological,^[17,20,24-26] biomechanical or motor-physical,^[19,24,27-30] and anthropometric^[17,18,20,23,27-29,31-36] parameters have been investigated. However, from a systematic and comprehensive viewpoint, the topic of TID in sport has not received much attention. This has led the dominant approach associated with TID to be a specificity approach with no comprehensive framework in this regard. Furthermore, from a strategic and managerial viewpoint, the causal circumstances, intervening factors, underlying conditions, and the TID implications have been less widely considered. Thus, using the grounded theory approach in this research, we have tried to examine the TID in the field of basketball and provide a model and framework for TID. Therefore, this research seeks to answer this question “How is providing a model and development of TID indices in the field of basketball based on physical-motor, psychological, anthropometric, and physiological parameters?”

MATERIALS AND METHODS

This research is a qualitative study (grounded theory) which was carried out in the field and using interpretive analysis. Therefore, to be best able to identify key items and components in TID in the field of basketball, the three groups of TID specialists (among professional clubs), basketball coaches (among premier league), and university professors (among professors of Tehran University, Shahid Beheshti University, and Kharazmi University) were consulted through in-depth interviews to access rich information.

Sampling was carried out in the form of targeted sampling. Inclusion criteria were included: (1) having expert in basketball, (2) having ≥ 5 -year experience in the basketball, and (3) having the satisfaction to participate in the study. Exclusion criteria were included having no willingness to participate in the study. The sample size in this research was not predetermined, and sampling continued until reaching the theoretical saturation threshold.

To ensure the validity of the interviews, the findings of the study were reviewed by experts and professors, and their views have been applied on the presentation of final results. For this purpose, a model has been identified, and the professors have reviewed and studied its items, and some cases have been modified and adjusted. To verify the reliability, the research steps were approved through process auditing (by demonstrating the path of research as well as providing the professors with all the analyzed data, codes, categories, goals, and research questions). In addition, in the present study, the method of intrasubject agreement of two encoders (raters) was used to calculate the reliability of the conducted interviews. The results showed that the total reliability between the two encoders is 84% and is very good.

The data analysis of in-depth interviews with individuals was performed through interpretive analysis techniques, using open coding, axial coding, and selective coding methods. Coding and categorization were used to reach conclusions on the content of the interviews. At this stage, the concepts and relations that should be analyzed were coded and categorized, so that each certain concept or category was considered as a code. In this research, coding was performed through three stages of open, axial, and selective coding. Using open coding, the data acquired in the interviews were categorized into some categories. Then, in the axial coding phase, the association between these categories was determined in the form of coding paradigm presented by Straus, A, and Corbin, J (2014) Then, in the selective coding phase, the components of coding paradigm were described, the scenario was plotted, and the final model was developed.

RESULTS

To encode the interviews, first, the interviewees' coding instructions as well as the instructions for encoding the interviews were determined. Then, based on these instructions, the concepts contained in the interviews were derived. In the initial coding step, a title was given to all the key points of the interviews related to the main questions of the research. The results of open coding including categories, subcategories, and the major and key concepts derived from the research are presented. As a result of the analysis of interviews, 10 categories, 30 subcategories, and 101 key concepts were extracted from the text of interviews.

In the axial coding, according to the interview process and based on the research objectives, TID was considered as the axial category, because it has all the features mentioned for

the axial category, and all the information gathered from the interviews have been on the TID in basketball. An axial coding model is presented in Figure 1. In this model, the categories extracted in open coding section have been determined based on their role in TID in the basketball field around the TID as an axial category and under the circumstances of causation, underlying or grounded conditions, interventionist or moderator conditions, and action/interaction and consequences. As a result of selective coding, the final model of TID in the field of basketball in Iran is presented in Figure 1.

DISCUSSION

This research was aimed at developing a model and framework for TID in the field of basketball. The final result of the study consists of seven components affecting the TID process along with the TID implications in the form of a model. These seven components include governmental and nongovernmental institutions, infrastructures, resources, management, culture, economic status, and the main centers of TID. Different governmental and nongovernmental organizations can pave the way for TID in the field of basketball and play different roles in the process. Although many presented models, such as Peltola^[11] and Côté *et al.*,^[13] have referred to the TID process more often, newer models including the model presented by Vaeyens *et al.*^[14] and Burgess and Naughton^[15] have referred to the role of environmental factors as the sport framework

as part of their model in TID. Furthermore, the results of this study introduce the basketball federation, the ministry of sports, and other involved institutions as a predisposing factor in TID. According to Article I of the Statute of the National Olympic Committee, the Basketball Federation is a nongovernmental organization responsible for basketball at national level, and from an international perspective, it is a member of the concerned International Basketball Federation. The sport federations are the main bodies responsible for the relevant sports field in the country, and every federation has its respective subsidiaries and sport boards in all cities and towns of Iran. The basketball federation, along with sport bodies of different provinces and cities, are considered to be the biggest network custodian of basketball in Iran. With proper planning and appropriate policies, the basketball federation can pave the way for TID in the country, so that, the task and responsibility of the TID in the field of basketball can be attributed to the basketball federation. The basketball federation is the main sponsor of the championship sport, the holding of professional basketball leagues, and competitions within the country. In addition, there are other activities in the field of recreational and educational sports, and it cooperates with other institutions in its specialized field in sports. Therefore, by holding competitions in different age groups, holding various leagues and events, the basketball federation can pave the way for the development and promotion of talented basketball athletes. The Ministry of Sports and Youth is also in charge for policymaking, targeting,

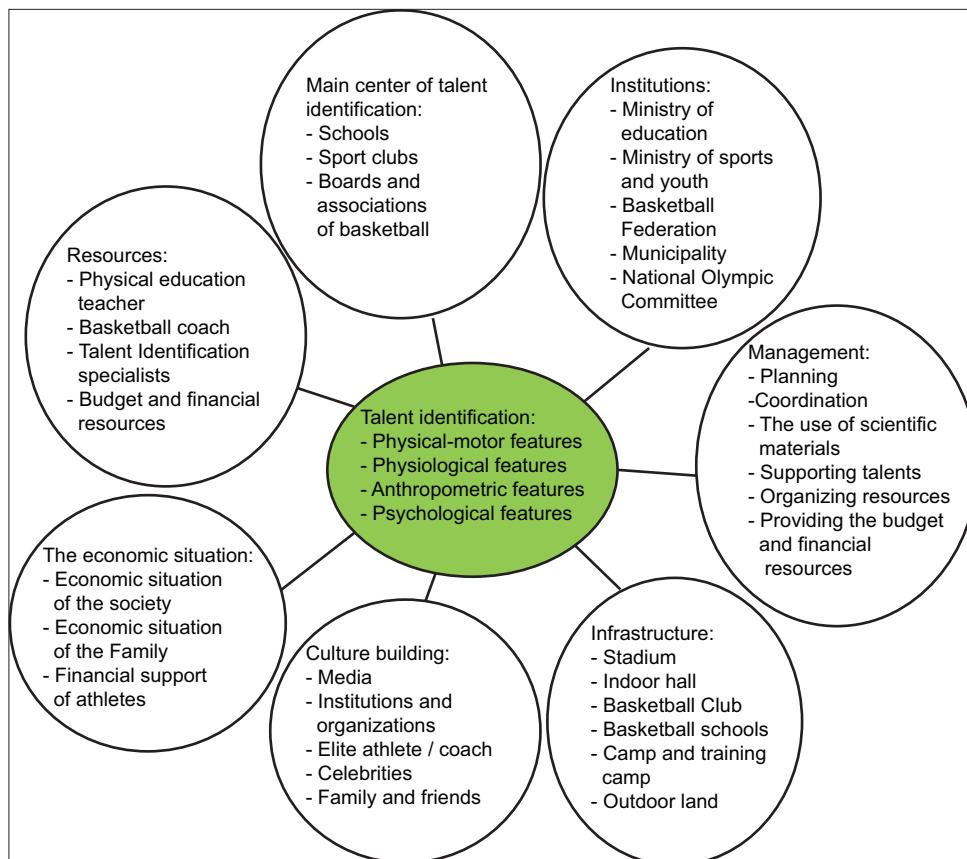


Figure 1: Talent identification model in the field of basketball

and providing the infrastructures necessary for various sport activities. With the provincial sports and youth departments as well as the sports and youth departments in each city, the ministry is of great influence on all sporting activities. Another influential institution is the Ministry of Education. The Ministry of Education plays an important role for the students of the country, who are also deemed as the future human resource of Iran. The Ministry of Education and especially its Deputy for Physical Education have extensive plans for the students' physical activity and sports. By providing the necessary conditions and requirements, the ministry can pave the way for sports and physical education development in the country. By providing the conditions and infrastructures necessary for the participation of their staff and the general public in sports, other organizations and institutions such as municipalities, military organizations, other ministries, and their subsidiaries can play a role in cultural development and public participation in sport activities.

The second component of the TID model in the basketball field is the main centers associated with TID. The main centers are institutions that provide the possibility of addressing the basic basketball. Schools are one of the most important, comprehensive and inclusive institutions for dealing with all sports, including basketball. In the TID system of the Soviet Union, schools played a major role, and were active at several levels, so that Riordan^[37] identified a hierarchy of six sports schools in the (former) Soviet Union. Furthermore, in the Chinese TID system, young athletes in the schools comprise the base of the TID pyramid of the country.^[7] In other countries, including Great Britain, the United States, Japan, Australia, and Canada, schools and sports schools also play a key role in the TID system. In the model presented by Burgess and Naughton,^[15] the association of school teachers with the TID process has been also considered. Schools can follow a systematic and organized approach to provide the children with the access to a variety of sports. All the interviewees considered schools as one of the most important sources of TID and emphasized its importance. Among other institutions whose primary duty is to deal with the sport of basketball are basketball boards, associations, centers, and clubs which can be very influential in the process of TID and pave the way for TID in the basketball field. Basketball schools, which are aimed at basketball training at an early age, are other important and influential institutions. The importance of the centers involved in TID and their influential role has been demonstrated in the models developed by Vaeyens *et al.*^[14] and Burgess and Naughton.^[15] Vaeyens *et al.*^[14] consider the centers involved in formal education and Burgess and Naughton^[15] also consider the body of national sports and team sports involved in the TID process.

The third component of the TID model in the field of basketball is infrastructures. Infrastructures are a collection of hardware and software facilities that provide the initial conditions for TID in the field of basketball. Among the models pointing to infrastructures in the process of TID, one can refer to the

model presented by Vaeyens *et al.*^[14] Furthermore, in TID systems in different countries, infrastructures are considered as a fundamental factor in the TID process. Sports facilities and utilities are the basic requirements for engaging in sports activities. Without sports facilities and utilities, it will not be possible to engage in sports activities. Each sport requires its own facilities and equipment. In the meantime, for growth and development, basketball also requires modern stadiums to hold tournaments, as well as indoor halls and outdoor basketball courts with easy and low-cost access for the general public. Therefore, for the development of sport facilities and utilities, there must be well-targeted and specific plans aimed at providing the conditions for the maximum presence of children in basketball sport programs. In fact, the availability of infrastructures will allow the widespread presence of children in basketball and provide a platform for talent development.

The fourth component of the TID model in basketball is human resources. In the process of TID, human resources are one of the most important and most influential predisposing factors. The importance of human resources, including physical education teachers and sports educators, has been demonstrated in the TID process of the models presented by Côté *et al.*,^[13] Vaeyens *et al.*,^[14] and Burgess and Naughton.^[15] Furthermore, the role of human resources in the TID systems of China, the United States, Canada, Australia, and Japan is undeniable. In the model presented in this research, physical education teachers of schools, basketball coaches, TID experts, and other executive forces such as referees, club managers, event managers, and organizations and administrative staff are among the most influential human resources in the process of TID in the field of basketball. According to the above explanations, schools are one of the major centers for finding and developing sports talents. Therefore, for the process of TID, physical education teachers should be well informed, knowledgeable, up-to-date, and familiar with TID skills in various fields. Furthermore, in sports clubs, the presence of specialist basketball coaches, that are also familiar with scientific TID methods, is a requirement for appropriate TID model.

The fifth component of the TID model in the field of basketball is the media. In the model developed by Burgess and Naughton,^[15] the media is at the heart of the TID model. They believe that media can affect all the factors that contribute to TID. The media is represented in various forms. Its traditional form includes television, radio, magazines, newspapers, and environmental advertisements (intra- and inter-city billboards), and modern media includes the internet sites and blogs, social networks, and mobiles and mobile applications. Media plays a variety of important roles in all fields, including sports. Informing, culture building, promotion of doing exercises and engaging in sports activities, production of sports programs for entertainment, and the coverage of basketball matches are currently the most important roles of the media in the country's sports industry and especially in the basketball. Broadcasting and coverage of basketball matches can have a dramatic effect on the development and popularity of this sport. The greater

popularity of this sport among people due to the coverage of basketball matches and events in various media such as television, radio, printed media, and modern media develops the market for the sport and increases the attraction of resources and fundraising. The media contribute to providing a suitable platform for basketball development, and thereby, they pave the way for the development and promotion of this sport.

The sixth component of the TID model in the basketball field is the management of the TID process. In the model presented by Burgess and Naughton,^[15] managing the activities, resource allocation and strategies are deemed as catalysts and parts of the TID process. Vaeyens *et al.*^[14] have also introduced TID activities management in their own model. Management is defined as planning, organizing, coordinating, and controlling activities to achieve certain goals. In the process of TID in the field of basketball, the issue of managing the process has been presented in various forms in interviews. The TID process should be clearly followed by the authorities responsible in the field including the basketball federation. Managing this process requires precise, long-term, medium-term, and short-term planning for TID activities, organizing human resources, and financing the TID costs, as well as necessary coordination among concerned institutions such as basketball schools, boards and centers, and TID centers. In order to achieve maximum productivity, the organization of human resources and other resources requires effective and efficient management of this activity. In the next phase, TID activities should be evaluated and controlled, and the diversion points of the plans and their effectiveness should be determined.

Finally, the seventh component of the TID model in the field of basketball is the concept of culture. Another important topic in support of TID in the field of basketball is culture deemed as a catalyst by Burgess and Naughton.^[15] Culture can be a causal factor in TID in basketball. Developing country-wide culture of sports makes families put more emphasis on the daily activities of their children and thereby have better plans for such activities. A good culture makes families support and encourage their children's sporting activities. There will be many factors influencing such a culture, and the use of media capacities can play a key role in developing such a culture. Social institutions, celebrities, popular athletes, physicians, and teachers can encourage people to exercise and actually participate in sporting events. Basketball can also gain benefits from such conditions.

CONCLUSIONS

The TID process in each sport field requires the examination of various factors in the talented individuals of that sport field on physical-motor, psychological, anthropometric, and physiological parameters. Various studies have shown that having some factors results in success in various sport fields. Among the factors examined in various studies associated with different sports, one can refer to

physiological,^[17-23] psychological,^[17,20,24-26] biomechanical or motor-physical,^[27,28,30,35] anthropometric,^[22,23,30,33-36] and a novel methodology using high-dimensional analysis^[38] parameters. The predictive success of a measured parameter may depend partly on its interaction with other characteristics, and partly on the competition requirements.^[39] In the performed interviews, TID factors in basketball were identified as belonging to one of the four different categories, including physical-motor factors (cardiovascular endurance, muscular endurance, muscular strength, power, flexibility, agility, speed, balance, and coordination), physiological factors (aerobic power and anaerobic power), anthropometric factors (height, weight, shoulder width, breast width, thigh length, leg length, length of arms and forearms, palm width, and hand size), and psychological factors (motivation, timely decision-making power, self-confidence, and mental illustration). Accordingly, having these factors increases one's likelihood of success in basketball and reaching the elite level.

If the TID process is carried out properly, it can lead to good results. Given the various benefits that sport activities have for a community, governments in various countries are spending a lot of money to achieve these benefits. The growth and development of sports and health within the community, the growth and development of basketball, increased qualitative level of basketball tournaments, developing elite athletes, strengthening national basketball teams in different age categories, and winning international awards in various competitions such as the Asian World and Olympic Games are some of the most desirable consequences for the systematic implementation of the TID process at the national level.

It is important to note that our models aimed to describe the best combination of parameters to explain variance in performances.^[39] In general, it can be said that TID in basketball requires a comprehensive system and coordination among different institutions and organizations so that through the proper use of resources, one can pave the way for identifying and developing the best sporting skills, scientifically and operationally. Therefore, it is suggested that through more closely coordination and cooperation with organizations responsible for basketball such as basketball bodies, basketball clubs, and schools, one can pave the way to find the sport talents. Furthermore, providing the physical education teachers and basketball coaches as the most important human resources with the necessary trainings related to the topic of TID can play a significant and undeniable role in creating the necessary context for the TID process in basketball.

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Conflicts of interest

There are no conflicts of interest.

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